# Appendix B

## The Theoretical Basis for Market Competition

# APPENDIX B

Prepared for King County

# The Theoretical Basis for Market Competition

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## Introduction

The purpose of this appendix is to provide a non technical overview of basic economic theory regarding competition. Part 1 discusses the benefits of competition, and the Part 2 discusses some of the reasons that certain industries are more likely to have higher levels of competition than others.

Appendix C characterizes the solid waste collection, processing, transfer and disposal markets relate to the economic theory presented in the first two parts. The primary conclusion is that a lack of competition in the solid waste transfer and disposal markets can result in higher prices and lower quality of service.

## Part 1: A Summary of Basic Economic Theory about Competition

This part of the appendix summarizes extensive economic literature about competition, or the impacts of market structure on market performance. The overriding conclusion of this summary is that increased competition results in lower prices and increased quality and levels of service. The term **market structure** refers to the number and size of participants in a market -- those firms or institutions producing a good or providing a service for sale (hereinafter the term "producer" refers to either a producer of a product or a provider of a service). Market performance refers to the extent to which the prices and quantities exchanged in the market reflect an efficient allocation of resources and avoid excessive profits to any single or group of producers. In other words, market performance refers to the level, quality and price of goods and services produced.

This discussion begins with an analysis of the two extreme examples of market structure. The first example has a single producer, and hence no competition among producers; this is called a monopoly. The second extreme example has a very large number of competitors each producing the same product (homogeneous or undifferentiated product) with no individual impact over the market price; this is called perfect competition. While these extreme market structures are seldom actually observed in modern industrial economies, they provide a useful set of bookends for discussing all other market structures where the number of producers ranges from two to many.

### Definitions of Economic Terms

To facilitate the discussion, we begin with some definitions of key terms (which are presented in a logical, rather than alphabetical, order). Producer markets consist of **firms** who are entities that produce the good or service being traded in the market. Firms employ labor, raw materials, capital goods, or land as **factors of production** to produce their product. The **industry** consists of all the firms involved in the production of the designated good or service. In theory, the definition of an industry is straightforward; in the real world, difficult decisions often must be made as to whether a firm is "in" or "out" of the industry. In general, to be a part of an industry, the firm must produce a **product** that is considered largely substitutable for products produced by all the other firms in the industry.

**Profit maximization** is considered by economists to be the objective of the firm. In employing the factors of production to produce its good or service, the firm incurs **production costs**. Production costs vary with the quantity of product produced. In the simplest case, **fixed costs** (such as those to construct a factory or to purchase land) can be added to **variable costs** (those costs which change according to the quantity produced, such as quantities of raw materials and energy and labor) to obtain **total costs.** It is obvious for a single firm that as quantity produced increases, and as the fixed costs are spread over more and more units of output, the **average cost**, or total cost divided by units of output produced, will decrease. As outputs increase, average costs tend to decrease, and this phenomenon is called **economies of scale**.

In some industries, average costs continue to decrease as quantity produced increases; these industries are termed **natural monopolies**, as it makes sense to have a single producer making all the goods if costs will be lowest in such a situation. Examples include utilities such as water and sewage. In other industries, average costs tend to plateau – once a producer reaches a certain level of output average costs neither increase nor decrease. Examples of such industries include **solid waste** collection.[1] In other industries, after decreasing over a certain range of outputs, costs tend to increase again, due to factors such as overuse of factory capacity that might result in overtime wages or higher equipment maintenance. This u-shaped average cost function is the one typically assumed by economists as applying to most manufacturing and service industries.

As production increases for any individual firm, total costs increase only by the amount of the variable costs incurred; fixed costs do not change. While average cost is defined as the quotient of total cost and quantity produced, there is another concept that is critical to economic analysis of the market. This concept is **marginal cost**, defined as the additional cost incurred in producing an additional unit of output. As fixed costs are not increasing along with output, marginal costs consist only of the increased variable costs incurred to produce a good or service. Like average costs, marginal costs may be constant, decreasing, or increasing. In most industries, marginal costs decrease at least as production is initiated. For example, factors of production like electricity may cost more when purchased in smaller quantities than in larger quantities, and such considerations, taken together, tend to make marginal costs decrease at least over some range of output. In manufacturing industries, marginal costs tend to decrease and then, at some point, to increase, for much the same reasons that average costs would tend to increase. Because marginal costs do not include fixed costs, they are lower than average costs as output is initially increased. Once marginal costs have turned upwards, they eventually exceed average costs, as, once again, the higher marginal costs are mitigated in the average cost function by the fixed cost element, which is allocated over increasingly large quantities of output.

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[1] Stevens, Barbara J. "Scale, Market Structure, and the Cost of Refuse Collection," *The Review of Economics and Statistics.* Vol LX, # 3 (August 1978), p. 445.

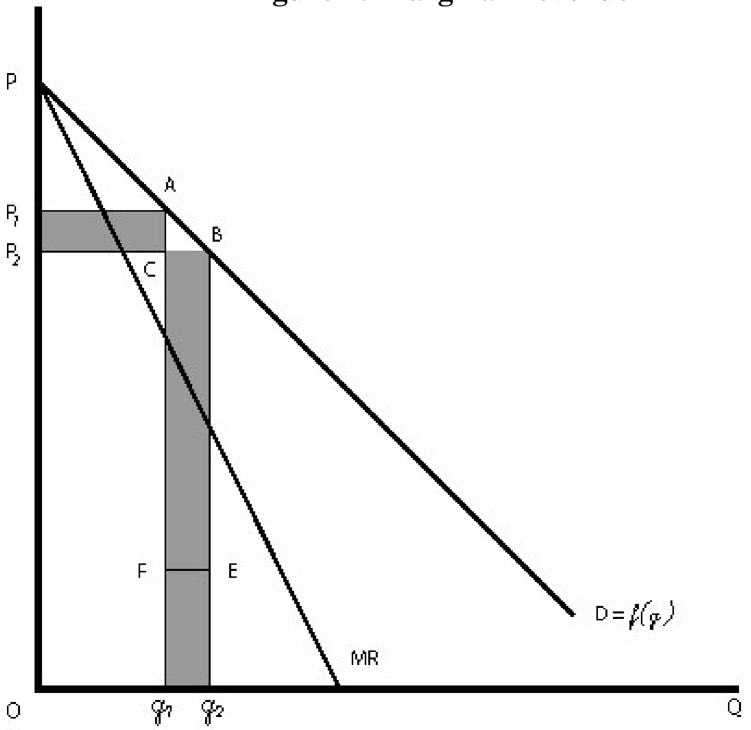
The firm maximizes its profit by selecting an output at which the dollar amount between the total revenue of producing that quantity exceeds the total cost generated by selling that quantity by more than for any other output level. The **total revenue** received by the firm is the product of the price the firm can charge for selling that quantity times the quantity sold. The price the firm can charge is a function of the demand for the product. The **demand function** facing the firm is the representation of buyers' preferences – it tells how many units buyers in the aggregate will purchase at any given price. At higher prices, buyers will in the aggregate, purchase less. For example, as the price of gasoline increases, customers tend to cluster their errands or defer trips to conserve on gas purchases, and the number of gallons of gasoline purchased decreases. Thus, demand functions expressing price as a function of quantity purchased tend to be downward sloping.

An additional important concept relates to the demand function. This concept is called **elasticity of demand.** Elasticity of demand is defined as the percentage change in revenue resulting from a unit increase in quantity purchased. Although typically the number resulting from this computation would be negative, as demand curves tend to be downward sloping and, therefore, marginal revenue will be decreasing, in practice economists use the absolute value of elasticity. Thus, an elasticity of "1" is considered unitary, and it occurs when a one percent increase in quantity sold results in a one percent decrease in revenue. If revenues decrease by more than one percentage point for a one percent increase in quantity, the demand function is said to be elastic at this point, and the absolute value of elasticity is greater than one. If revenues decrease by less than one percentage point for a one percent increase in quantity, the demand function is inelastic. The more elastic a demand function is, the more demand is sensitive to prices changes.

As total revenue is the product of price times quantity, it follows that **average revenue** is total revenue divided by quantity. Like the total cost function, the total revenue function has a **marginal revenue** aspect. Marginal revenue is the additional revenue that the firm will receive from selling an additional unit. Figure 1 represents **marginal revenue** graphically. The figure shows a typical downward sloping demand function, and its associated **marginal revenue** function. Total revenues at price P1 are represented by the rectangle O-P1-A-Q1. When sales are increased to Q2, total revenues are represented by the rectangle O-P2-B-Q2. The change in revenues, or **marginal revenue**, consists of a loss represented by the dotted area (rectangle P2-

P1-A-C), and a gain represented by the shaded area (rectangle Q1-C-B-Q2). Here, the gain exceeds the loss, and the marginal revenue is positive. The net gain is shown as that portion of the gain which is not also dotted (rectangle F-C-B-E). In general, as increments to sale occur, total revenues at first increase, meaning that **marginal revenue** is positive and that the **elasticity of demand** is less than one. Eventually, as sales increase, increments to total revenue become negative (the loss of revenue from selling all units at a lower price exceeds the gain in revenue from selling more units), and **marginal revenue** becomes negative. In this range of the demand function, the **elasticity of demand** exceeds one.

**Figure 1: Marginal Revenue**



For the firm, profits are maximized when the difference between total revenue and total costs is at a maximum. An equivalent way to express this is to say that profits are maximized when the additional revenue from selling an additional unit is just equal to the additional cost of producing that unit, or when marginal revenue equals marginal cost.[2] While firms in industries with very different levels of competition all seek to maximize profits, the degree of competition in an industry has a great impact on the quantity that will be produced and the price that will be charged at a profit maximizing equilibrium.

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[2] For those with a mathematical background, P = TR - TC, where P=profit, TR=total revenue, and TC = total cost. The maximum of this function in q, quantity, is determined by setting the first derivative equal to zero, which is equivalent to setting marginal revenue (the first derivative of TR) equal to marginal cost (the first derivative of TC). The second derivative, of course, must be negative for this to be a maximum.

## Competition, Monopoly, and Duopoly/Oligopoly

### Perfect Competition

Perfect competition is defined as a large number of firms selling a homogeneous product and a large number of buyers. Markets for agricultural products, such as wheat, are common examples of perfectly competitive markets. In a perfectly competitive market, input and output prices are not affected by actions of any individual firm. As far as the individual firm is concerned, it faces a constant prevailing market price (or, in other words, a horizontal demand function). The firm maximizes profit by equating its marginal cost of production to the prevailing market price, as price equals marginal revenue (P=MR), as far as the individual firm is concerned. Of course, when all the production of all the individual firms is totaled, and when one looks at the industry as a whole, one can recognize that there is, indeed, a downward sloping demand function, but that each individual firm's small size relative to the market prevents it from perceiving the relationship between price and sales. Even if the firm did recognize this industry wide relationship, its own production is too small a percentage of the industry's for that individual firm to exert any impact on market prices. The perfect competitor would sell zero if he charged more than the going market price, and it does not make any sense to charge less than the going market price, as he can sell his entire profitable production at the going market price. [3]

**It is important to note that economists consider that marginal costs include all the cost of capital, so that the equation of marginal cost to price does not mean that the perfect competitor is not considered to be earning appropriate returns on invested capital. However, the perfect competitor does not have the power over the market forces to earn above-normal returns on investment**.

### Monopoly

In a monopoly, there is a single producer, so the demand function facing the industry is the same as the demand function facing the producer. The monopolist's profits are maximized by setting marginal revenue equal to marginal cost (MR=MC), and determining the price the market will bear (the point on the average revenue curve) associated with the production quantity at which MR=MC. This market clearing price is higher than marginal revenue. Marginal revenue equal to marginal cost equal to price is the equality that allows normal returns to capital. Price in excess of marginal cost allows excess returns to capital. These excess returns are typically earned by curtailing production – this means that some buyers who would be willing to buy at prices lower than that charged by the monopolist (while still in excess of marginal cost) are not satisfied. Their loss of satisfaction is one of the economic costs of monopoly. In other words, prices are expected to be higher for monopolies than they would be if there were competition for the products or services provided.

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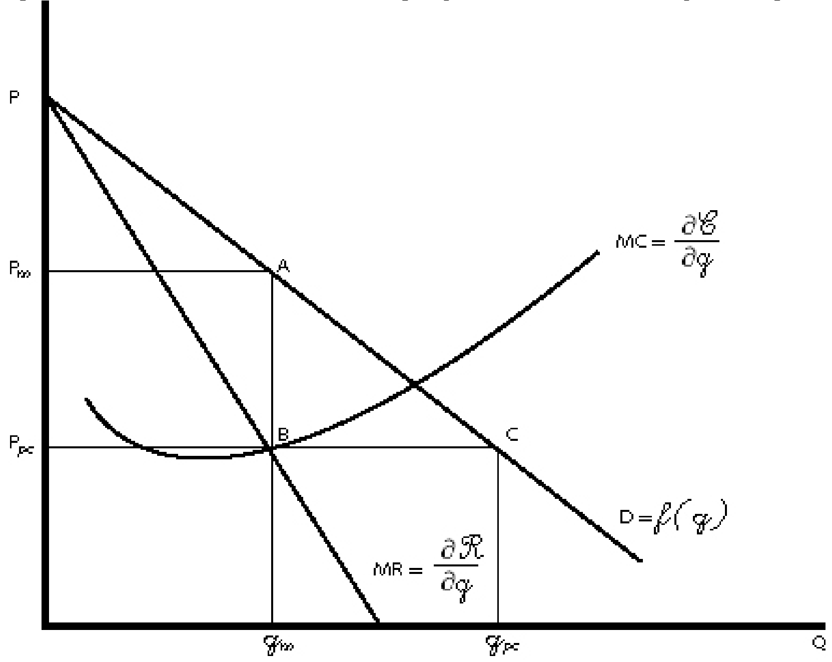
[3] Henderson, James M. and Richard E. Quandt. *Microeconomic Theory: A Mathematical Approach.* New York, NY: McGraw-Hill Book Company, 1958, p. 165

Figure 2 shows the relative prices and outputs expected in a perfectly competitive industry and monopoly. For simplicity, the demand functions for the perfectly competitive industry and the monopolist are shown as the same, and the marginal cost function for the monopolist is shown as the same as that for the perfectly competitive industry (the addition of all the marginal cost functions of all the individual firms in the market). Setting MR=MC results in an output quantity for the monopolist of $q_{m,}$ and a price of $p_m$, determined by the intersection of $q_m$ and the demand function. Conversely, the perfectly competitive industry would result in a price set at the level of MR=MC, and an output of $q_{pc}$, significantly greater than that of the monopolist. Excess profits earned by the monopolist are represented by the amount ($p_m$ -p $_{pc}$ )* $q_m$. Aggregate loss in consumer satisfaction between the monopolist and the perfectly competitive industry market equilibria is the sum of the monopolist's excess profits plus the area included in the triangle, ABC, representing the satisfaction to those customers willing to buy at prices in excess of the perfectly competitive price yet below the monopolist's price. Note that another impact of monopoly over perfect competition is that in monopoly part of the consumer satisfaction that would accrue in perfect competition (pm-ppc)* $q_m$ is shifted to the monopolist. So, monopoly results in curtailed output, compared to perfect competition. The monopolist garners excess profits, which would, in the case of perfect competition, have accrued to buyers in the form of consumer satisfaction.

**Figure 2: Outputs and Prices in the Monopoly and the Perfectly Competitive Industry**


P
$P_m$
A
$MC = \frac{\partial \mathcal{C}}{\partial q}$
$P_{pc}$
B
C
$D = f(q)$
$MR = \frac{\partial \mathcal{R}}{\partial q}$
$q_m$
$q_{pc}$
Q

Monopolists may occur in the market for final goods or services, or in the market for inputs. For example, producers of fabricated aluminum products may also own production facilities for aluminum ingots. Or, producers of refuse collection services may also own facilities for providing refuse disposal services. Firms that own the facilities for producing inputs are called **vertically integrated**. As Caves notes, integrated producers can put the "squeeze" on nonintegrated producers by raising the price of an input, while holding constant the price of the final good.[4] Further, monopolists at the input level may be able to extract all the available monopoly profit at that stage, leaving the final stage with many competitors.

### Duopoly and Oligopoly

When the number of producers in a market is greater than one and less than many, each producer is aware that his actions have an impact on the market price and output. Each producer acts with an awareness that his actions have an impact not only on the market but also on other producers. Each firm's actions may elicit a response by other firms. The market with just two producers is called a duopoly. Oligopoly is the term used to refer to a market with more than one and fewer than many firms.

There are no generally accepted behavior reactions for oligopolists and duopolists. There are many different solutions– each based on a different set of behavior assumptions.[5] In turn, we will discuss the Cournot, collusion, Stackelberg, game theory, and monopolist competition theories of the oligopolist market.

### Cournot Solution

Augustin Cournot, a French economist published in 1838, was not really discovered until 45 years later.[6] The basic assumption of his analysis is that each duopolist strives to set the quantity to produce, assuming that the quantity output of his rival is fixed. In other words, Cournot adopts the not very reasonable assumption that there will be no reaction to the actions of one firm operating in an industry with just two firms. Each firm, despite this myopic assumption, has a complete reaction function, which expresses its own profit maximizing output, given any output of its rival. In the Cournot world, a firm sets output repeatedly, assuming each time that it is maximizing profits in a world where the output of its rival is fixed at the then current level. As each firm has such a reaction function, equilibrium occurs when profit maximizing output A for firm A in the presence of output B for firm B is the same as the profit maximizing output B for firm B in the presence of output A for firm A.

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[4] Caves, Richard. *American Industry: Structure, Conduct, Performance*. (7th edition) Englewood Cliffs, NJ: Prentice Hall, 1992, p. 42.

[5] Henderson, James M. and Richard E. Quandt. *Microeconomic Theory: A Mathematical Approach.* New York, NY: McGraw-Hill Book Company, 1958, p. 176.

[6] Scherer, F.M. *Industrial Market Structure and Economic Performance*. Boston, MA: Houghton Mifflin, Co., 1979, p. 152.

The Cournot solution can be expressed as a function of price rather than quantity, a variable that most economists believe is more likely to be set by rivals than quantity.[7] The model still results in sequential price cutting and profit decrease. As Scherer states, "by failing to recognize that rivals will react to its price initiatives, a firm conforming to the Cournot assumption is guilty of myopia, and economists have come to believe that the Cournot assumption is quite unrealistic when applied to pricing decisions involving only a few firms."[8]

### Collusion Solution

A collusion solution occurs when duopolists or oligopolists agree to act together to maximize joint profits. This means that prices and quantities are set as if the firms are multi plant operations owned by the same entity. The marginal cost of each firm is set to equal the marginal revenue of the industry demand. Side payments between the firms can assure that each is better off after collusion (if not caught by the authorities) than in the absence of collusion. In general, colluding duoplists produce a smaller total output and a higher price for a larger total profit than in the Cournot case.[9] The best example of the effects of collusion was the creation of the Organization of Petroleum Exporting Countries (OPEC) in the 1970's (see AppendixD). There have also been a number of well-documented illegal cartels or price fixing scandals in the US solid waste market place.

### Stackelberg Solution

Heinrich von Stackelberg was a German economist who came up with the leadership/followership analysis of duopolists. In his model, each firm computes the profits to be earned if he is a leader, assuming that the other firm will operate according to a Cournot type reaction function. Then, each firm computes its profits from followership by substituting its rival's leadership output into its own reaction function and solving for its profit maximizing output. There is a four way profit matrix for this model: (1) Firm A acts as a leader and Firm B acts as a follower; (2) Firm B acts as a leader and Firm A acts as a follower; (3) neither firm acts as a leader; and (4) both firms try to act as a leader. If Firm A chooses to act as a leader and Firm B chooses to act as a follower, or vice versa, there is a deterministic solution in the Stackelberg model. If Firm A and Firm B each choose to act as followers, the Stackelberg solution reduces to the Cournot solution. If Firm A and Firm B each choose to act as leaders, then their expectations will not be met, and price wars can result.

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[7] Scherer, F.M. *Industrial Market Structure and Economic Performance*. Boston, MA: Houghton Mifflin, Co., 1979, p. 154

[8] ibid, p. 155

[9] Henderson, James M. and Richard E. Quandt. *Microeconomic Theory: A Mathematical Approach.* New York, NY: McGraw-Hill Book Company, 1958, p. 180

## Game Theory

In the twentieth century, von Neumann and Morgenstern analyzed the duopolist's situation as a zero sum game and arrived at a deterministic solution. In a zero sum game, the profit earned by one firm is a loss to the other. Each firm is hypothesized to have a limited set of strategic alternatives, and it is assumed to know the profit payoff if it selects each one. The von Neumann Morgenstern assumptions are further modified to assume that firms want to minimize risk – Firm A will pick the alternative that will yield the best alternative out of the worst outcomes possible (maximin strategy), and Firm B will pick the minimum of the maximum that A can earn (minimax). This theory works if firms have perfect knowledge of each other's cost functions and if they are dealing with something that is truly zero sum, such as market share.[10] The theory does not work very well in the real world with imperfect knowledge and when firms may be working with maximizing a variable, such as profits, which is not necessarily zero sum.

## Monopolistic Competition

The many models based on a Cournot or Stackelberg type analysis all suffer from the fact that they assume that firms believe their rivals will not react to their price or output decisions. In 1929, Edward Chamberlain of the United States came up with the theory of monopolistic competition that expressly recognized that firms in a market with few sellers are fully aware of their interdependence.[11]

The essence of Chamberlain's analysis is that firms in a mutually dependent market will act *without collusion* to obtain the monopoly solution. Chamberlain states that "for the monopoly price to emerge, it is essential only that the firms recognize their mutual interdependence and their mutual interest in a high price."[12] There is no reason for a duopoly to engage in explicit price agreements and other illicit activities – if the industry is conducive to a monopoly price, then this can arise without collusion.

Oligopolists tend to be aware that they may face buyers with differing elasticities of demand. When the inelastic and the elastic demand functions are summed to obtain the industry demand function, there tends to be a resulting "kink" in the industry demand function. Interestingly, this kink in the average revenue or demand function results in a vertical space in the marginal revenue function. This means that costs can change quite a bit, and the marginal cost function will still intersect the industry marginal revenue function in this vertical space – in other words, even when costs vary, profit maximizing oligopolists will find it sensible to maintain prices and output levels. This factor explains why oligopolists tend not to engage in price cutting. An oligopolist who cuts prices tends not to be followed; one who raises prices is more likely to be followed by his rivals.

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[10] Scherer, F.M. *Industrial Market Structure and Economic Performance*. Boston, MA: Houghton Mifflin, Co., 1979, p. 160

[11] Chamberlain, Edward. *The Theory of Monopolistic Competition*. Cambridge, MA: Harvard University Press, 1933, 6th edition. p. 59.

[12] Scherer, F.M. *Industrial Market Structure and Economic Performance*. Boston, MA: Houghton Mifflin, Co., 1979, p. 155

## Regulated Monopoly

Public policy in the United States has never tried to encourage competition in several areas, especially provision of utility services, such as electric power, gas, water, and sewer, where scale economies are large and sunk costs are high. In these markets, demand is generally inelastic, and a large profit could be earned by a monopolist. Recognizing the advantages of monopoly service provision in the presence of high capital costs and declining average costs, the public sector tends to step in and regulate the prices charged by the service provider. Caves cites three reasons for regulating such natural monopolies: 1) to correct market failure and avoid large monopolistic profits to the provider; 2) to resolve political conflicts and ensure that low prices are charged to specific groups such as residents; and 3) to provide political benefit to select groups – at a relatively low cost to the general public.[13]

Rate regulation of utilities and other regulated monopolies often takes some form of establishing a fair rate of return on invested capital. While this sounds good, the formula provides an incentive for the firm to overinvest in order to increase returns. Economists expect that regulated companies will be more capital intensive than unregulated companies, in order to maximize aggregate profits. There is also little incentive for regulated companies to negotiate for the lowest price for their factors of production. If they pay above the minimum for capital goods, their rate base is increased by the overpayment, and so are their profits. There is similarly little incentive to negotiate for the lowest wages or fringe benefit packages or implement other cost saving initiatives, if a cost plus regulatory scheme, or variation thereon, is in effect.

This has been documented as the Averch-Johnson effect in regulated monopolies, who find that electric utilities, who need to maintain a capital plant capable of generating power sufficient to meet peak demand are reluctant to engage in peak load pricing, which would reduce the size of the plant needed, and, consequently, the capital invested and returns earned.[14] Similarly, when airline deregulation was legislated in the 1970's, new entrants arrived with lower fares and lower wages for workers, indicating that regulated firms had paid above market wages. Caves cites that fares had fallen by 1980 to 73% of the 1975 average fare as set by the Civil Aeronautics Board.[15] (See Appendix D for a discussion on the deregulation of the airline industry)

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[13] Caves, Richard. *American Industry: Structure, Conduct, Performance,* (7th edition) Englewood Cliffs, NJ: Prentice Hall, p. 109

[14] Averch, Harvey and Leland Johnson, "Behavior of the Firm Under Regulatory Constraints," *American Economic Review,* Vol. LII (December 1962), pp. 1052-1069

As can be seen from this discussion, there is a wealth of economic literature on monopolies, oligopolies, and market concentration. **There is one overriding result: Greater competition results in:**

- Lower prices;
- More choices for the consumer;
- Higher levels of service; and
- Better quality of service.

## Part 2. Market Structures and the Causes of Market Concentration and Decreased Competition

This section discusses factors that impact on the degree of competition and the number of competitors in a market. Key factors associated with reduced competition, each of which is discussed below, include barriers to entry or exit, product differentiation, and the essential cost structure of an industry are key determinants of industry structure and the extent of or lack of competition in the industry.

Michael Porter of the Harvard Business School lists the determinants of perfect competition as low entry barriers, absence of economies of scale, high transportation costs, high inventory costs or erratic sales fluctuations, no advantage of size, diseconomies of scale in some important aspect, high product differentiation, exit barriers, diverse market needs, local regulation, and government prohibition of concentration.[16] This list essentially reduces to entry barriers (or lack thereof), product differentiation, and the essential cost structure of the industry. Each is discussed in turn, as a key determinant of market structure. The greater the barriers to entry and the greater the product differentiation, other things equal, the greater the concentration in the industry and the more likely its pricing and output equilibria are to approach the monopolistic levels. Cost structures that have monotonically declining average cost functions create natural monopolies, which tend to elicit regulation. Finally, the impact of buyers on market prices is briefly discussed.

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[15] Caves, Richard. *American Industry: Structure, Conduct, Performance,* (7th edition) Englewood Cliffs, NJ: Prentice Hall, 114-115.

[16] Porter, Michael E. *Competitive Strategy: Techniques for Analyzing Industries and Competitors*. New York, NY: The Free Press, 1998, p. 196-200. Porter refers to industries which approximate the conditions for perfect competition as fragmented industries.

## Barriers to Entry

Barriers to entry can be economic, as when an extremely large capital investment is necessary to enter the industry, as is true for aerospace or oil refinery industries. Barriers to entry can also be intellectual, as when a firm patents a product for a period of time, thus assuring the right to market the product as a monopolist for a fixed period, in return for having invested the research time and dollars to create the product in the first place. Drugs and technological advances often fall into this category. Capital requirements as a barrier to entry are particularly effective when the capital required is invested in items such as advertising campaigns attempting to create a new brand identity, expenditures that can not be recouped if the campaign is not a success.[17]

Additional barriers to entry may be created by the strategic decisions of business entities. Xerox, for example, chose to lease its copier machines rather than to sell them, as this created a higher capital barrier to entry to a competing firm. Switching costs from one competitor to another may affect entry. This has repeatedly been found to be a problem in the solid waste collection industry, where so called "evergreen" contracts make it extremely difficult and expensive for a customer to switch from one hauler to another.[18] Even where the suppliers do not inflict such costs directly, there are costs such as retraining personnel and installations that increase the cost to change from one supplier to another.

Barriers to entry can also be caused by government regulations. For example, an agency of the US Government limits access into cable television by auctioning a finite number of franchises. Entry into the legal profession is limited to those who pass the bar exam. Many local governments set insurance requirements as a prerequisite to doing business with a firm. As Caves succinctly states, absolute cost elements (such as patents and licenses to certain raw materials, e.g., ores) and product differentiation put the costs of a new firm above those of an established one.[19] Entry barriers can theoretically be measured according to how high the price of a good or service can be raised without attracting entry. In the long run, if prices are "too high" and government regulation does not forbid entry (as, for example, is the case in the solid waste industry, *de facto*, in San Francisco[20]) then one would expect entry to occur, driving prices back to a more competitive level.

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[17] Porter, Michael E. *Competitive Strategy: Techniques for Analyzing Industries and Competitors*. New York, NY: The Free Press, 1998, p. 9

[18] While evergreen contracts have differing provisions from one community to another, they typically allow for automatic renewal unless a notification is given sufficiently (often six or twelve months) in advance, or, without such notification, monetary penalties are assessed.

[19] Caves, Richard. *American Industry: Structure, Conduct, Performance,* (7th edition) Englewood Cliffs, NJ: Prentice Hall, p. 36

[20] The San Francisco City Charter forbids the entry of new firms unless 90% of the customers on any route complain about the *quality* [not the price] of service.

### Product Differentiation

Product differentiation can also create a form of a barrier to entry. When one firm differentiates its product from another through an extensive advertising campaign, for example, product loyalty arises, and more and riskier capital investments from new entrants would be required to wrest market share from the entrenched competitor. Thus, product differentiation, for example, is practiced by Pepsi and Coca-Cola, serves to create a barrier to entry into the soft drink business.

One impact of product differentiation is that, as brand loyalty is created, the individual firm faces a much less elastic demand function. This endowing of the demand curve with inelasticity means that each producer has, to at least some degree, the ability to set its own price.

### Natural Monopoly and Determinants of Market Structure

As has been discussed in part 1 of this Appendix, a natural monopoly occurs when economies of scale accrue virtually continuously, and when there are definite cost advantages to having a single supplier of a good or a service. Such industries tend to maintain these characteristics over the long term. Indeed, it is generally true that no industry has high barriers to entry one year, followed by low barriers to entry the next. "The intensity of competition in an industry is rooted in its underlying economic structure and goes well beyond the behavior of current competition."[21]

Porter believes that industries differ fundamentally in their ultimate profit potential. This is attributable, he argues, to the strength of the competitive forces in a particular market. Industries such as tires, paper, and steel have intense competition, and no firms in these industries garner spectacular earnings. In contrast, firms in industries such as oil-field equipment and services, cosmetics, and toiletries commonly earn high returns, due to the lack of intense competition as reflected by high barriers to entry caused by product differentiation, capital requirements, and intellectual property rights.[22]

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[21] Porter, Michael E. *Competitive Strategy: Techniques for Analyzing Industries and Competitors*. New York, NY: The Free Press, 1998, p. 3.

[22] ibid.

**Bargaining Power of Buyers**

When buyers have detailed knowledge of a producer's cost structure, or when buyers represent a large portion of the industry, these buyers are often able to negotiate advantageous prices. General Motors, for example, self-manufactures some parts, and this knowledge of what the process costs gives them an advantage in negotiating with outside suppliers. When municipal governments retain some in-house production capability, as when public sector workers perform some water treatment whereas some water treatment is contracted to the private sector (e.g. in Raleigh, NC), the public sector can use its in house costs of production as a starting point in conducting negotiations with the private sector contractor.

## Conclusion

In sum, different structural factors among industries inherently affect the degree of competition. The nature of certain industries (the cost of what they produce, and demand for their products) may naturally lead to less competition, with all the potential negative consequences outlined in the preceding part of this appendix. Action may be required in some industries to ensure that adequate competition occurs.

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